

Information Science and Technology Center Seminar



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"Do we click? Speaker-listener neural coupling underlies successful communication"

Wednesday, September 29, 2010
3:00 - 4:00 PM
TA-3, Bldg. 1690, Room 102 (CNLS Conference Room)

Abstract: While verbal communication is a joint activity, speech production and comprehension have primarily been analyzed as independent processes within the boundaries of individual brains. Here, we applied fMRI to record neuronal responses from both speakers and listeners during natural verbal communication. We used the speaker's spatiotemporal brain responses to model listeners' brain responses and we find extensive speaker-listener coupling, which vanishes when participants fail to communicate. Moreover, while on average the listeners' brain responses mirror the speaker's responses with a delay, we also find areas which exhibit predictive anticipatory responses. We connected the extent of neural coupling to a quantitative measure of story comprehension and find that the greater the speaker-listener coupling, the greater the understanding. In particular, the extent of anticipatory couplings captures 50% of the behavioral variance. We argue that the observed interaction between production- and comprehension-based processes serves as a mechanism by which brains convey information.

Biography: Greg Stephens received his Ph.D in theoretical physics under the direction of Bei-Lok Hu from the University of Maryland with a dissertation on topological defect formation in non-equilibrium phase transitions. After his Ph.D he came to Los Alamos National Laboratory where he worked with Wojciech Zurek in T-division then with Garrett Kenyon in P-division after switching fields to computational neuroscience. Stephens is currently a Swartz Fellow working with Bill Bialek at Princeton University.